

“Think About It” – Transitioning Climate Information and Predictions to Decision Aids*

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Transitioning climate information and predictions to decision aid

We use irrigation decision as an example to demonstrate this transition. The decision scenario is: Your farm is located in the northern part of Franklin County in south-central Nebraska. Like most of your neighbors, you are growing corn in silt loam soil that can hold 2 inches of available water per foot, and you use a center pivot system that pumps water from a ground-water system, and has the capacity to put on 1 inch of water in 3 days. The ground water allocation for farmers in this area this year is 11 inches. You planted corn on May 1st, today is Monday, June 20th, and your corn is in the ten-leaf stage. So far this season, you have not needed to irrigate. Most of your neighbors have not irrigated yet either—though one or two have. Since mid-May, your area has only received about 2.5 inches of rainfall, and you are trying to decide if you should irrigate and, if so, how much you should irrigate. (Note: In this scenario, the price of corn is \$2.25 per bushel. The cost to apply an inch of water is \$6.50 per acre.)

Farmers will be given the following weather and climate predictions and crop water use condition, and asked to use any to make their provisional irrigation decision.

1. Observed percentage of soil water content
2. Soil moisture accumulation
3. Five-day rainfall forecast – Nebraska QPF
4. Rainfall probability forecast
5. 5-day T_{min} and T_{max} predictions
6. Wind predictions, and
7. Crop water use summary

In viewing each of these products farmers will be asked a couple of questions will be asked to measure how well they understand the product, both formats and contents. For the soil water content map a question is:

“According to the map, what is the average soil Water content in Franklin County in NE for the week of June 14-20?”

Five possible answers are given as choices (e.g., less than 10%; 20-50%, ...) and farmers/users are asked to explain their choice and also encouraged to make suggestions for improvement of the product.

Here is the **novelty** of this transition method: While going through each product, farmers/users are provided with the “*Coaching*” materials, in written form or audio or video, that explain how the particular product should be interpreted (from a professional perspective). For example, in the soil moisture map, the coaching materials include “The color bar below this map shows the percentage values for the color code in the map. For example, the yellow color corresponds to the soil water content between 40 and 50% of the maximum available soil water for crop use.” Additional interpretations of the map are saved in a *resources folder* that users can click if want to read more.

From this coaching about the map the user may be able to understand and read it and find “what this product tells me” about the soil moisture. After reading the map, the user can compare his interpretation of the map with the “*Consultant and expert feedback*” on how this product tells the soil moisture condition in the concerned area. The expert feedback for this particular map reads as “For the week of June 14-20 the average soil water content varies inside Franklin County. The water content is near 30-40% of the difference between the field capacity and wilting point in the southern tier of the county, as shown by the light orange color, and it gradually increases northward and reaches 70-80% in the northern tier of the county, as shown by the green color. Thus, the increase is shown in east-west bands of higher soil water content from the south to the north. Dependent on which band your farms are in you can read the soil water content at your farms from the color in that band and the content value corresponding to that color in the color code shown below the map. The case scenario indicated that your farm is in the northern part of Franklin County, so your farm is probably in the 50-80% range (light green, green, and light blue colors cover the northern half of Franklin County).”

After knowing, with confidence, “what this product/forecast tells me,” the user will decide if the information should be used in the irrigation decision. In this decision, the user is faced with the challenge of knowing how is this product and its information relevant to the irrigation decision. When accurate prediction is used in irrelevant situations the prediction becomes bad. We evaluate this knowledge of farmers by asking the question: *On a scale of 0-6, how important or relevant is this information to making a good irrigation decision in this case?* The user will rate the relevance. In making this rating the user is provided the “*Expert coaching*” which explains in detail “How can this information be used in irrigation decision.” In this coaching material careful analyses of why and how this information should, and how much of it, should be used in irrigation decision are given. From reading or hearing these coaching materials the user can compare his understanding of how this product should be used in the decision and how an expert would use the information in the decision, and learn how to use the product in this decision.

Then, the user can rate the relevance of the product for this particular decision in the scenario. After giving the rating the user can compare his rating with both peers who are also using this transitioning tool and the “*Consultant feedback*” built in this tool. This consultant provides an expert view of how relevant this product and its information is for the particular irrigation decision. For the soil moisture product our Consultant feedback reads “Experts rated this information as a 3 on the zero to six-point scale. Thus, the information provided by the product is moderately useful in this case” and further explains the reason. This consultant feedback shows the user how to integrate the information of this product with the actual situation and other information, e.g., rainfall and temperature predictions, to make a more effective irrigation decision.

The same “training” has been developed for understanding and correctly using the other weather and climate products. At the end of the training, the model provides an expert feedback to synthesize all the available information and make an effective decision.

A computer module of this climate transitioning tool is being developed and some interfaces are shown below.

